

SPECIFICATION AMENDMENTS

On page 1, insert above line 1, insert--Priority Claim

The present application claims priority on European Patent Application 02016089.1 filed 19 July 2002.--

On page 1, above line 1, insert--Field of the Invention--

Paragraph at line 1 of page 1 has been amended as follows:

-- The invention is directed relates to a process to generate heat by burning a liquid fuel in an evaporator burner oven.--

On page 1, above line 4, insert--Background of the Invention--

Paragraph at line 4 of page 1 has been amended as follows:

-- ~~Processes to generate heat in domestic applications are known, wherein kerosene~~ Kerosene or gasoil is used as fuel in evaporator burner ovens to generate heat in domeestic applications. Examples of such ovens are supplied by Jotul ASA Norway, AGA Foodservices Group, Sunpot, and Corona plc. The ovens are technically simple and often require no additional moving parts to operate. For example, the fuel may be supplied to the oven by means of gravity wherein the fuel tank is positioned at a somewhat elevated position relative to the oven itself. If the tank is empty the user will typically have to refill the tank by hand. This method of generating heat, for example to provide domestic heating, lighting or household cooking, is very popular in regions which are not provided with a natural gas supply means. The fuel most often used is kerosene.--

Paragraph at line 19 of page 1 has been amended as follows:

--A disadvantage of the use of such ovens is that they sometimes fail to function due to coke deposits inside the oven. Coke deposits may form at the bottom plate of the burner when operating at a low power demand. Such failure is particularly disadvantageous Especially when such ovens are used for domestic heating, especially during long and strong cold winters ~~such breakdown is not favored~~.

Paragraph at line 26 of page 1 has been amended as follows:

~~--The object of the present invention is to~~ It would be useful to provide a process wherein the reliability and efficiency of the evaporator burner oven is improved.
Additionally, as well as reduced emissions are reduced and therefore improving health and safety issues are therefore improved.

On page 2, after line 13, insert--Summary of the Invention

The invention is directed to a process to generate heat comprising burning a liquid fuel in an evaporator burner oven, wherein the liquid fuel comprises a Fischer-Tropsch derived fuel.--

On page 2, after the above, insert--Brief Description of the Drawings

Fig. 1A shows the smoke number vs. time for an oven operated with a Fischer-Tropsch derived kerosene.

Fig. 1B shows the smoke number vs time for an oven operated with a petroleum derived kerosene.

Fig. 2A shows the hydrocarbon emission vs. time for an oven operated with a Fischer-Tropsch derived kerosene.

Fig. 2B shows the hydrocarbon emission vs. time for an oven operated with a petroleum derived kerosene.

Fig. 3A shows the carbon monoxide content vs. time for an oven operated with a Fischer-Tropsch derived kerosene.

Fig. 3B shows the carbon monoxide content vs. time for an oven operated with a petroleum derived kerosene--

On page 2, delete line 1 --4.

On page 2, above line 5, insert--Detailed Description of the Invention--

Paragraph at line 5 of page 2 has been amended as follows:

-- Applicants found that when a Fischer-Tropsch derived fuel is used less carbon deposits tend to form. It is found that the Smoke Number, which is correlated with the amount of carbon deposits, is significantly lower when a Fischer-Tropsch derived fuel is used. Because of the lower carbon deposits less failure of the oven will result. Furthermore, a decrease in soot deposits will also be beneficial for achieving a better heat transfer, thereby maintaining a high efficiency of the oven over a prolonged period of time. An additional advantage is that this fuel has no significant ~~odour~~ odor. The traditionally used kerosene fuel normally has a strong smell and any spills of kerosene on clothing and ground while filling the tank will be smelled for a prolonged time. By using the Fischer-Tropsch derived fuel a much more consumer friendly process is obtained. Applicants have further found that the carbon monoxide emissions and the unburned hydrocarbon emissions are significantly lower when using the Fischer-Tropsch derived fuel when compared to the traditional kerosene fuel.--

Paragraph at line 33 of page 2, ending at line 19 of page 3, has been amended as follows:

-- The evaporator burner oven, which may be used in the process of the present invention, may be any oven known to one skilled in the art, which operates, by combustion of ~~evaporating~~ evaporated liquid fuel with an oxygen containing gas. In such ovens the fuel is supplied to a surface wherein it evaporates into a space surrounding said surface and wherein the evaporated fuel is combusted with oxygen containing gas supplied to said space. Such a surface may be a wick or the exterior of fuel supply conduits which conduits are provided with openings to discharge said fuel from the interior to said exterior surface. Such evaporating burner ovens are for example described in general textbook "Heizung + Klimatechnik 01/02" German Version by Recknagel, Sprenger, Schramek, ISBN: 3-468-26450-8 on page 718. Examples of such evaporator burner ovens are the so-called Forced Air Type Open Oil Heater, Natural Draft Open Wick Type Oil Heater, the ovens as manufactured by Jotul from Norway, as for example the Jotul 709 Oven, the well known AGA cooker as manufactured by the Aga Foodservice Group plc and similar ovens of other suppliers such as for example Windhager, Schraak, Haas & Sohn, Buderus, Sunpot or Corona.--

Paragraph at line 20 of page 3 has been amended as follows:

-- The evaporating burner oven should be distinguished from burners which first ~~atomise~~atomize the fuel into small droplets, e.g. so-called "pressure-jet" burners, and wherein the combustion takes place on the surface of the resulting small liquid droplets or takes place on the evaporated mixture of fuel and gas.--

Paragraph at line 26 of page 3, ending at line 7 of page 4, has been amended as follows:

-- The Fischer-Tropsch derived fuel will comprise a Fischer-Tropsch product which may be any fraction of the middle distillate fuel range, which can be isolated from the (hydrocracked) Fischer-Tropsch synthesis product. Typical fractions will boil in the naphtha, kerosene or gas oil range. Preferably, a Fischer-Tropsch product boiling in the kerosene or gas oil range is used because these fractions are easier to handle in, for example, domestic environments. Such products will suitably comprise a fraction larger than 90 wt% which boils between 160 and 400 °C, preferably to about 370 °C. Examples of Fischer-Tropsch derived kerosene and gas oils are described in EP-A-583836, WO-A-9714768, WO-A-9714769, WO-A-011116, WO-A-011117, WO-A-0183406, WO-A-0183648, WO-A-0183647, WO-A-0183641, WO-A-0020535, WO-A-0020534, EP-A-1101813, US-A-Pat. No.5766274, US-A-Pat. No.5378348, US-A-Pat. No.5888376 and US-A-Pat. No.6204426 all of which are hereby incorporated by reference.--

Paragraph at line 8 of page 4 has been amended as follows:

-- The Fischer-Tropsch derived product will suitably contain more than 80 wt%, especially more than 90 wt% iso and normal paraffins and less than 1 wt% aromatics, the balance being naphthenics compounds. The content of ~~sulphur~~ sulfur and nitrogen will be very low and normally below the detection limits for such compounds. This low content of these elements is due to the specific process wherein the Fischer-Tropsch reaction is performed. The content of ~~sulphur~~ sulfur will therefore be below 5 ppm and the content of nitrogen will be below 1 ppm. As a result of the low contents of aromatics and naphthenics compounds the density of the Fischer-Tropsch product will be lower than the conventional mineral derived fuels. The density will be between 0.65 and 0.8 g/cm³ at 15 °C. --

Paragraph at line 22 of page 4, ending at line 7 of page 5, has been amended as follows:

-- The fuel used in the process of the present invention may also comprise fuel fractions other than the Fischer-Tropsch derived fuel product. Examples of such components may be the kerosene or gas oil fractions as obtained in traditional refinery processes, which upgrade crude petroleum feedstock to useful products. Preferred non-Fischer-Tropsch fuel fractions are the ultra low ~~sulphur~~ sulfur (e.g. less than 50 ppm ~~sulphur~~ sulfur) kerosene or diesel fractions, which are currently on the market. Optionally non-mineral oil based fuels, such as bio fuels, may also be present in the fuel composition. The content of the Fischer-Tropsch derived product in the fuel will be preferably be above 40 wt%, more preferably above 60 wt% and most preferably above 80 wt%. It should be understood that the content of such, currently less available, Fischer-Tropsch derived products will be ~~optimised~~ optimized, wherein pricing of the total fuel will be balanced with the advantages of the present invention. For some applications, fuels fully based on a Fischer-Tropsch derived product plus optionally some additives may be advantageously used.--

Paragraph at line 8 of page 5 has been amended as follows:

-- Evaporator burners are often provided with a flame detector. Most detectors, which are used today, detect a particular wavelength associated with the yellow ~~colour~~ color of the flame. Applicants have now found that when a Fischer-Tropsch derived fuel is used, the commonly known detectors fail to observe the resulting blue ~~coloured~~ colored flame. For this reason, the evaporator burner is preferably provided with a detector, which can detect this blue flame. Examples of suitable detectors are the detectors that are used in so-called blue flame burners. ~~a flame detector is used.~~ Examples of such suitable detectors are the UV sensors and IR sensors. A more preferred detector is the so-called ~~ionisation~~ ionization sensor. An ~~ionisation~~ ionization sensor is suitable to monitor burners with intermittent operation as well as continuous operation. The principle of operation of the ~~ionisation~~ ionization flame monitor is based on the rectifying effect of a flame. If a flame is present, a current flows between the burner and the ~~ionisation~~ ionization electrode. This ~~ionisation~~ ionization current is evaluated by the flame monitor to determine if a flame is present. In some prior art applications, ~~ionisation~~ ionization sensors could not be used in combination with a liquid fuel because deposits in the sensor led to false currents in the sensor. Because use of the Fischer-Tropsch derived fuel, especially a fuel composition not

containing a metal based combustion improver additive, results in less deposits, ~~ionisation~~ ionization sensors can be applied. This is an advantage because these sensors are more readily available than the IR or UV sensors. Alternatively additives may be added to the Fischer-Tropsch derived fuel which result in a flame which can be detected by the above standard detector.--

Paragraph at line 5 of page 6 has been amended as follows:

-- The fuel may also comprise one or more of the following additives: ~~;~~ detergents, ~~Detergents~~, for example OMA 350 as obtained from Octel OY; stabilizers, for example Keroxon ES 3500 as obtained from BASF Aktiengesellschaft, FOA 528A as obtained from OCTEL OY; metal-deactivators, for example IRGAMET 30 (as obtained from Speciality Chemicals Inc; (ashless) dispersants, for example as included in the FOA 528 A package as obtained from Octel OY; anti-oxidants; IRGANOX L57 as obtained from Speciality Chemicals Inc; cold flow improvers, for example Keroflux 3283 as obtained from BASF Aktiengesellschaft, R433 or R474 as obtained from Infineum UK Ltd; anti-corrosion: Additin RC 4801 as obtained from Rhein Chemie GmbH, Kerocorr 3232 as obtained from BASF, SARKOSYL 0 as obtained from Ciba; re-odorants, for example Compensol as obtained from Haarman & Reiner; biocides, for example GROTA MAR 71 as obtained from Schuelke & Mayr; lubricity enhancers, for example OLI 9000 as obtained from Octel; dehazers, for example T-9318 from Petrolite; antistatic agents, for example Stadis 450 from Octel; and foam reducers, for example TEGO 2079 from Goldschmidt.--

Paragraph at line 27 of page 6 has been amended as follows:

-- Applicants found that metal-based combustion improvers, which typically are added to the fuel composition used in the prior art method, can be left out of the fuel. This is advantageous because as explained above, ionization ~~ionisation~~ sensors may then be advantageously applied. Metal-based combustion improvers are for example ferrocene and ; methylcyclopentadienylmanganese-tricarbonyl (MMT).

Paragraph at line 1 of page 7 has been amended as follows:

-- The Fischer-Tropsch derived product is ~~colourless~~ colorless and odorless ~~odourless~~. For safety reasons, an ~~odour~~ odor marker, as for example applied in natural gas

for domestic consumption, may be present in the Fischer-Tropsch derived product. Also a ~~colour~~ color marker may be present to distinguish the fuel from other non-Fischer-Tropsch derived product.--

Table 1 on page 7 has been amended as follows:

Table 1

	Fischer-Tropsch kerosene	Reference oil: Norway Kero
Density (at 15 °C)	734.8 <u>734.8</u>	810
Kinematic viscosity at 20 °C (mm ² /s)	1.246	Not Measured
Flash point (°C)	43	Not Measured

Table 2 on page 8 has been amended as follows:

Table 2

Time period (seconds)	Feed rate SMDS Kero	Feed rate (kg/h) Norway Kero
0 and 1800: middle load.	0.2 <u>0.2</u>	0.15 <u>0.15</u>
1800 and 3600: maximum load.	0.4 <u>0.4</u>	0.324 <u>0.324</u>
3600 and 5400: minimum load.	0.14 <u>0.14</u>	0.092 <u>0.092</u>

Paragraph at line 1 of page 8 has been amended as follows:

-- During the experiment, the Smoke Number according to DIN 51402-1, the hydrocarbon content by means of photo ionization detector (FID) and the carbon monoxide content by infrared spectroscopy in the exhaust gases leaving the oven were measured. The results of these measurements are presented in Figures 1^a – 3^a.

Paragraph at line 15 of page 8, ending at line 5 of page 9, has been amended as follows:

-- As can be seen from Figures 1-3, ~~is that~~ the process according to the present invention results in a reduction of hydrocarbons and carbon monoxide in the exhaust of the oven. This is very advantageous because health, safety, environment and efficiency issues

are improved. Emissions that are harmful to human health are reduced (soot and potential carcinogenic ~~potential~~material). Also, ~~CO~~ with respect to carbon monoxide, danger of suffocation in case of leakages of exhaust gases into the room is reduced. A complete combustion, indicated by a lack of unburned hydrocarbons and low ~~CO~~ carbon monoxide emissions, also increase efficiency. Decreased hydrocarbon emissions also decrease the danger of chimney burns. ~~Less~~ Fewer soot deposits also prevent the formation of films on the heat exchanger surface, which can decrease the heat transfer and therefore the resulting efficiency.--

On page 10, above line 1, insert --We claim:--